

CLAIMS

1. A portable concrete plant for preparing ready mix concrete, the portable concrete plant comprising:

a frame having at least one set of wheels attached thereto for supporting the
5 frame above a ground surface and permitting the frame to be moved
along the ground surface;

a cement storage region attached to the frame, wherein the cement storage
region stores cement, and wherein the cement storage region has a
cement entry port and a cement exit port;

10 a sand storage region attached to the frame, wherein the sand storage region
stores sand, and wherein the sand storage region has a sand entry port
and a sand exit port;

a rock storage region attached to the frame, wherein the rock storage region
stores rock, and wherein the rock storage region has a rock entry port
15 and a rock exit port;

a water storage region attached to the frame, wherein the water storage region
stores water, and wherein the water storage region has a water entry
port and a water exit port;

a slurry mixer attached to the frame, wherein slurry mixer has a slurry mixer
20 entry port and a slurry mixer exit port, wherein the cement exit port
and the water exit port are operably connected to the slurry mixer entry

port, wherein the slurry mixer prepares a slurry from cement and water;

a first conveyor system attached to the frame, wherein the first conveyor system receives rock from rock exit port and sand from the sand exit port and transports the rock and sand to a system exit port; and

5 a second conveyor system attached to the frame, wherein the second conveyor system receives slurry from the slurry mixer exit port and transports the slurry to the system exit port, wherein the first conveyor system and the second conveyor system intersect proximate the system exit port to cause the slurry to be mixed with the sand and the rock for preparing the ready mix concrete.

10 2. The portable concrete plant of claim 1, and further comprising:

a cement weight monitoring mechanism operably attaching the cement storage
15 region to the frame; and

a sand weight monitoring mechanism operably attaching the sand storage
region to the frame;

a rock weight monitoring mechanism operably attaching the rock storage
region to the frame; and

20 a water weight monitoring mechanism operably attaching the water storage
region to the frame.

3. The portable concrete plant of claim 1, wherein the slurry mixer comprises:
 - an outer enclosure;
 - a first stirring apparatus fixedly mounted to the outer enclosure; and
 - a second stirring apparatus rotatably mounted in the outer enclosure.

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4. The portable concrete plant of claim 3, wherein the slurry mixer has a self-cleaning configuration in which the first stirring apparatus and the second stirring apparatus clean each other and the second stirring apparatus cleans an inner surface of the outer enclosure as the second stirring apparatus is rotated in the outer enclosure.

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5. The portable concrete plant of claim 3, wherein the second stirring apparatus rotates about a substantially vertically oriented axis.

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6. The portable concrete plant of claim 1, and further comprising a mixing apparatus mounted proximate the system exit port for mixing together the rock, sand and slurry.

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7. The portable concrete plant of claim 6, wherein the mixing apparatus imparts a swirling motion to the rock, sand and slurry as the rock, sand and slurry pass through the mixing apparatus.

8. The portable concrete plant of claim 1, and further comprising a dust collection system attached to the frame, wherein the dust collection system collects dust generated by moving the cement in the portable concrete plant.

5 9. The portable concrete plant of claim 8, wherein the dust collection system has a self-cleaning configuration such that dust collected in the dust collection system is transferred to the slurry mixer or to a disposal region.

10. The portable concrete plant of claim 1, and further comprising a second cementous component storage region attached to the frame, wherein the second cementous component storage region stores a second cementous component, and wherein the second cementous component storage region has a second cementous component entry port and a second cementous component exit port, wherein the second cementous component exit port is operably attached to the slurry mixer entry port.

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11. The portable concrete plant of claim 1, wherein the cement storage region, the sand storage region, the rock storage region, and the water storage region each include a load cell for continuously measuring the weight of components therein.

20 12. The portable concrete plant of claim 1, and further comprising an internal combustion engine attached to the frame for powering the operation of the portable concrete plant.

13. The portable concrete plant of claim 1, and further comprising a heat
exchanging apparatus attached to the frame, wherein the heat exchanging apparatus
heats water being delivered to the water storage region and cools hydraulic oil used to
5 operate the components in the portable concrete plant.

14. The portable concrete plant of claim 1, and further comprising a control room
attached to the frame, wherein the control room includes controls for controlling the
operation of the portable concrete plant.

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15. A system for preparing ready mix concrete, the system comprising:
a portable concrete plant comprising:
a frame having at least one set of wheels attached thereto for
supporting the frame above a ground surface and permitting the
frame to be moved along the ground surface;
a cement storage region attached to the frame, wherein the cement
storage region has a cement entry port and a cement exit port;
a sand storage region attached to the frame, wherein the sand storage
region has a sand entry port and a sand exit port;
20 a rock storage region attached to the frame, wherein the rock storage
region has a rock entry port and a rock exit port;

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- a water storage region attached to the frame, wherein the water storage
region has a water entry port and a water exit port;
- 5 a slurry mixer attached to the frame, wherein slurry mixer has a slurry
mixer entry port and a slurry mixer exit port, wherein the
cement exit port and the water exit port are operably connected
to the slurry mixer entry port, wherein the slurry mixer
prepares a slurry from cement and water;
- 10 a first conveyor system attached to the frame, wherein the first
conveyor system receives rock from rock exit port and sand
from the sand exit port and transports the rock and sand to a
system exit port; and
- 15 a second conveyor system attached to the frame, wherein the second
conveyor system receives slurry from the slurry mixer exit port
and transports the slurry to the system exit port; and
- 20 16. The system of claim 15, and further comprising:
a cement weight monitoring mechanism operably attaching the cement storage
region to the frame; and

a sand weight monitoring mechanism operably attaching the sand storage
region to the frame;

a rock weight monitoring mechanism operably attaching the rock storage
region to the frame; and

5 a water weight monitoring mechanism operably attaching the water storage
region to the frame.

17. The system of claim 15, wherein the slurry mixer comprises:

an outer enclosure;

10 a first stirring apparatus fixedly mounted to the outer enclosure; and
a second stirring apparatus rotatably mounted in the outer enclosure.

18. The system of claim 17, wherein the slurry mixer has a self-cleaning

configuration in which the first stirring apparatus and the second stirring apparatus

15 clean each other and the second stirring apparatus cleans an inner surface of the outer
enclosure as the second stirring apparatus is rotated in the outer enclosure.

19. The system of claim 15, and further comprising a mixing apparatus mounted
proximate the system exit port for mixing together the rock, sand and slurry.

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20. The system of claim 19, wherein the mixing apparatus imparts a swirling motion to the rock, sand and slurry as the rock, sand and slurry pass through the mixing apparatus.

5 21. The system of claim 15, and further comprising a dust collection system attached to the frame, wherein the dust collection system collects dust generated by moving the cement in the portable concrete plant.

10 22. The system of claim 21, wherein the dust collection system has a self-cleaning configuration such that dust collected in the dust collection system is transferred to the slurry mixer or to a disposal region.

15 23. The system of claim 15, and further comprising a control room attached to the frame, wherein the control room includes controls for controlling the operation of the portable concrete plant.

20 24. A method for preparing ready mix concrete, the method comprising:
providing a frame having at least one set of wheels attached thereto for supporting the frame above a ground surface and permitting the frame to be moved along the ground surface;

storing cement in a cement storage region, wherein the cement storage region

is attached to the frame, wherein the cement storage region has a

cement entry port and a cement exit port;

storing sand in a sand storage region, wherein the sand storage region is

5 attached to the frame, wherein the sand storage region has a sand entry

port and a sand exit port;

storing rock in a rock storage region, wherein the rock storage region is

attached to the frame, wherein the rock storage region has a rock entry

port and a rock exit port;

10 storing water in a water storage region, wherein the water storage region is

attached to the frame, wherein the water storage region has a water

entry port and a water exit port;

mixing cement and water in a slurry mixer to prepare a slurry, wherein the

slurry mixer is attached to the frame, wherein slurry mixer has a slurry

15 mixer entry port and a slurry mixer exit port, wherein the cement exit

port and the water exit port are operably connected to the slurry mixer

entry port;

conveying rock and sand from the rock exit port and the sand exit port to a

system exit port with a rock conveyor system, wherein the rock

20 conveyor system is attached to the frame; and

conveying slurry from the slurry mixture exit port to the system exit port with a sand conveyor system, wherein the sand conveyor system is attached to the frame.

5 25. The method of claim 24, and further comprising collecting dust generated by conveying the cement into the cement storage region and feeding the collected dust into the slurry mixer.

10 26. The method of claim 24, wherein the slurry mixer includes a self cleaning paddle system that is rotatable about a vertically oriented axis.

15 27. The method of claim 24, wherein conveying the slurry from the slurry mixture exit port to the system exit port comprises:

moving the slurry out of the slurry mixer with a rotating auger;

15 moving the slurry delivered from the rotating auger to a manifold with a centrifugal pump; and

moving the slurry from the manifold to the system exit port with at least one slurry pump.

20 28. A slurry mixer for preparing slurry, the slurry mixer comprising:
a substantially cylindrical side wall with a lower end and an upper end;

a base wall enclosing the lower end of the side wall and defining a mixing region in which the slurry is prepared;

a first stirring apparatus fixedly mounted in the mixing region, wherein the first stirring apparatus has first mixing elements attached thereto; and

5 a second stirring apparatus rotatably mounted in the mixing region, wherein the second stirring apparatus has second mixing elements attached thereto, wherein the first mixing elements and the second mixing elements at least partially engage each other as the second stirring apparatus is rotated to remove slurry therefrom, and wherein the

10 second mixing elements engage the side wall as the second stirring apparatus is rotated to remove slurry from the side wall.

29. The slurry mixer of claim 28, wherein the first stirring apparatus includes an upper member and a plurality of upper mixing members that extend from the upper

15 member.

30. The slurry mixer of claim 29, wherein the second stirring apparatus has a lower member and a plurality of lower mixing members that extend from the lower member.

31. The slurry mixer of claim 30, wherein the upper mixing members are offset from the lower mixing members so that the upper mixing members pass between the lower mixing members as the second stirring apparatus is rotated.

5 32. The slurry mixer of claim 31, wherein the upper mixing members and the lower mixing members engage each other as they move passed each other to remove slurry therefrom.

10 33. The slurry mixer of claim 28, and further comprising a dispensing auger positioned in the mixing region proximate the base wall for dispensing slurry from the mixing region.

15 34. The slurry mixer of claim 28, and further comprising a motor operably connected to the second stirring apparatus for rotating the second stirring apparatus.

35. The slurry mixer of claim 28, and further comprising a top wall enclosing the upper end of the side wall.

20 36. The slurry mixer of claim 35, wherein the top wall has a cement feed port, a water feed port and an admixture feed port.

37. The slurry mixer of claim 35, and further comprising a dust collection apparatus operably connected to the slurry mixer.

38. A flow control device for controlling the flow of material through an opening,
5 the flow control device comprising:
a rotatable paddle element mounted with respect to the opening; and
a pivotable gate element mounted with respect to the opening, wherein the
gate element is pivotable between an open position and a closed
position, when in the closed position, the paddle element and the gate
10 element are adjacent each other to prevent the material from flowing
through the opening.

15 39. The flow control device of claim 38, wherein the paddle element is rotatable about a rotational axis that is parallel to and offset from a pivot axis about which the gate element is pivotable.

40. The flow control device of claim 38, wherein the paddle element has a plurality of paddles extending therefrom.

20 41. The flow control device of claim 38, wherein the paddle element is rotatable about a rotational axis that is substantially parallel to a direction in which the material flows through the opening.

42. A method of preparing ready mix concrete, the method comprising:
storing cement in a cement storage region;
storing sand in a sand storage region;
5 storing rock in a rock storage region;
heating water with a heating apparatus;
storing the heated water in an insulated storage region, wherein the insulated
storage region has sufficient size to store heated water for at least two
10 batches of ready mix concrete; and
mixing cement, sand, rock and heated water to prepare a batch of ready mix
concrete.
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43. The method of claim 42, wherein the insulated storage region has sufficient
size to store heated water for all batches of ready mix concrete prepared in a day.
44. The method of claim 42, wherein the insulated storage region has a capacity
of up to about 15,000 gallons.
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45. The method of claim 42, wherein the heated water is heated to a temperature
of between about 100°F and 200°F.